

American River Basin: Upper Unionhouse Creek Flood Protection Project

Attachment 8: Economic Analysis – Water Supply Costs and Benefits

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The Upper Unionhouse Creek Flood Protection Project provides a broad array of benefits within the American River Basin (ARB) Region and externally to the Sacramento-San Joaquin Delta (Delta). While some of these benefits may be quantifiable via economic analyses, many benefits provided by the project cannot be quantified due to their complex nature. This attachment provides economic analyses of water supply benefits expected as a result of implementation of the Upper Unionhouse Creek Flood Protection Project. In general, this Project will provide indirect water supply benefits.

Summary

Unionhouse Creek, a tributary to Morrison Creek in the southern part of the City of Sacramento and in unincorporated Sacramento County, floods out of bank in 100-year and more frequent storms. An estimated 250-300 homes are in the 100-year floodplain. The proposed project seeks to keep 100-year flood flows within the channel from the confluence of Unionhouse and Strawberry Creek, downstream to Franklin Boulevard where the federal South Sacramento Streams Group (SSSG) project (Federal Project) will commence. The project will remove up to 300 homes from the floodplain, relieving the homeowners of the burden of flood insurance. The lower reach of Unionhouse Creek below Franklin Boulevard has already been improved under the South Sacramento Streams Group (SSSG) project (Federal Project). The reach between Franklin Blvd and Center Parkway has been under study as a part of the SSSG, but the project would enable this reach to be removed from the Federal Project, keeping it out of the State Plan of Flood Control and avoiding state liability for its maintenance. The project will solve flooding issues in the project reach at a lower cost than could be achieved with the Federal Project, and by removing this reach from the Federal Project will leverage other federal, state and local funds for underfunded flood control needs elsewhere in the Morrison Creek watershed.

The Upper Unionhouse Flood Protection Project will address the existing flood risk along Unionhouse Creek by expanding the width and adjusting the depth of the existing channel between Franklin Boulevard and Bruceville Road. This project would significantly reduce the likelihood of overbank flooding in this portion of the creek and would provide at least a 100-year level of flood protection to the lands adjacent to the creek in this area thus removing between 250 and 300 homes from the regulated floodplain and relieving the homeowners of the burden of costly flood insurance. Additionally, the widening of Upper Unionhouse

Creek will result in slower velocities in that reach and subsequently may decrease sedimentation (improve settling), thus improving the water quality in the Unionhouse Creek and downstream reaches of Morrison Creek. Finally, the flood protection afforded by the Upper Unionhouse Creek Flood Protection Project will facilitate the development of a light rail extension project currently planned for the publically-owned corridor adjacent to Unionhouse Creek between Franklin Boulevard and Bruceville Road. This corridor currently contains Cosumnes River Boulevard, a two lane road that extends eastward from Franklin Boulevard to Highway 99. The Sacramento Regional Transit Authority (RT) has received Federal approval to extend light rail service through this corridor along the northern edge of the expanded roadway; however, the project cannot proceed until the flood control issues associated with Unionhouse Creek are resolved.

Summary of Costs and Benefits

As documented in Attachment 4, the budgetary estimate for the Project is \$1,953,546. The total present value of the project is \$1,934,031 and is based on a 50-year project life cycle, which is consistent with the life cycle assumed in the flood damage reduction benefit analysis. The majority of the budget (approximately 69%) for the Upper Unionhouse Creek Flood Protection Project is for project construction/implementation, with a portion of the budget for planning, environmental review, permitting and design (20%) in addition to smaller amounts for direct project administration, a project contingency, environmental compliance, and construction administration. Project costs will be spread out over an implementation period between September of 2011 and July of 2012. An additional \$20,000 per year will be required post-construction for operations and maintenance for vegetation bank management, channel maintenance (bottom scraping), erosion repair and other site-specific maintenance.

A summary of the benefits and costs for the project is provided in Table 1. Total present value costs for this project are \$1,934,031 and are illustrated in Table 2.

Table 1: Benefit-Cost Analysis Overview

	Present Value
<u>Costs</u> – Total Capital and O&M	\$1,934,031
<u>Qualitative Benefit or Cost</u>	Qualitative indicator*
Flood Control Benefits	
Flood Damage Reduction to adjacent watershed	++
Water Supply Benefits	
Incidental recharge of underlying groundwater basin over earthen channel areas and/or cracks in channel lining	+
Water Quality Benefits	
Reduction in pollutant loading to downstream reaches	+
Other Benefits	
Facilitation of light-rail extension project	++
O&M = Operations and Maintenance	
* Direction and magnitude of effect on net benefits:	
+ = Likely to increase net benefits relative to quantified estimates.	
++ = Likely to increase net benefits significantly.	
– = Likely to decrease benefits.	
– – = Likely to decrease net benefits significantly.	
U = Uncertain, could be + or –.	

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Table 2: Annual Cost of Project
(Referenced as Table 14 in Exhibit D of Proposition 1E Grant PSP)

Annual Cost of Project Project: Upper Unionhouse Creek Flood Protection Project									
	Initial Costs	Operations and Maintenance Costs (1)						Discounting Calculations	
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
YEAR	Grand Total cost From Table 7 (row (i), column (d))	Admin	Operation	Maintenance	Replacement	Other	Total Costs (a) +...+ (f)	Discount Factor	Discounted Costs (g) x (h)
2009	\$0.00						\$0.00	1.000	\$0
2010	\$0.00						\$0.00	0.943	\$0
2011	\$566,479.00						\$566,479.00	0.890	\$504,166
2012	\$1,387,067.00						\$1,387,067.00	0.840	\$1,165,136
2013				\$20,000			\$20,000.00	0.792	\$15,840
2014				\$20,000			\$20,000.00	0.747	\$14,940
2015				\$20,000			\$20,000.00	0.705	\$14,100
2016				\$20,000			\$20,000.00	0.665	\$13,300
2017				\$20,000			\$20,000.00	0.627	\$12,540
2018				\$20,000			\$20,000.00	0.592	\$11,840
2019				\$20,000			\$20,000.00	0.558	\$11,160
2020				\$20,000			\$20,000.00	0.527	\$10,540
2021				\$20,000			\$20,000.00	0.497	\$9,940
2022				\$20,000			\$20,000.00	0.469	\$9,380
2023				\$20,000			\$20,000.00	0.442	\$8,840
2024				\$20,000			\$20,000.00	0.417	\$8,340
2025				\$20,000			\$20,000.00	0.394	\$7,880
2026				\$20,000			\$20,000.00	0.371	\$7,420
2027				\$20,000			\$20,000.00	0.350	\$7,000
2028				\$20,000			\$20,000.00	0.331	\$6,620
2029				\$20,000			\$20,000.00	0.312	\$6,240
2030				\$20,000			\$20,000.00	0.294	\$5,880
2031				\$20,000			\$20,000.00	0.278	\$5,560

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Annual Cost of Project Project: Upper Unionhouse Creek Flood Protection Project									
	Initial Costs	Operations and Maintenance Costs (1)						Discounting Calculations	
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
YEAR	Grand Total cost From Table 7 (row (i), column (d))	Admin	Operation	Maintenance	Replacement	Other	Total Costs	Discount Factor	Discounted Costs
2032				\$20,000			\$20,000.00	0.262	\$5,240
2033				\$20,000			\$20,000.00	0.247	\$4,940
2034				\$20,000			\$20,000.00	0.233	\$4,660
2035				\$20,000			\$20,000.00	0.220	\$4,400
2036				\$20,000			\$20,000.00	0.207	\$4,140
2037				\$20,000			\$20,000.00	0.196	\$3,920
2038				\$20,000			\$20,000.00	0.185	\$3,700
2039				\$20,000			\$20,000.00	0.174	\$3,480
2040				\$20,000			\$20,000.00	0.164	\$3,280
2041				\$20,000			\$20,000.00	0.155	\$3,100
2042				\$20,000			\$20,000.00	0.146	\$2,920
2043				\$20,000			\$20,000.00	0.138	\$2,760
2044				\$20,000			\$20,000.00	0.130	\$2,600
2045				\$20,000			\$20,000.00	0.123	\$2,460
2046				\$20,000			\$20,000.00	0.116	\$2,320
2047				\$20,000			\$20,000.00	0.109	\$2,180
2048				\$20,000			\$20,000.00	0.103	\$2,060
2049				\$20,000			\$20,000.00	0.097	\$1,940
2050				\$20,000			\$20,000.00	0.092	\$1,840
2051				\$20,000			\$20,000.00	0.087	\$1,740
2052				\$20,000			\$20,000.00	0.082	\$1,640
2053				\$20,000			\$20,000.00	0.077	\$1,540
2054				\$20,000			\$20,000.00	0.073	\$1,460
2055				\$20,000			\$20,000.00	0.069	\$1,380
2056				\$20,000			\$20,000.00	0.065	\$1,300
2057				\$20,000			\$20,000.00	0.061	\$1,220

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Annual Cost of Project
Project: Upper Unionhouse Creek Flood Protection Project

	Initial Costs	Operations and Maintenance Costs (1)						Discounting Calculations	
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
YEAR	Grand Total cost From Table 7 (row (i), column (d))	Admin	Operation	Maintenance	Replacement	Other	Total Costs	Discount Factor	Discounted Costs
2058				\$20,000			\$20,000.00	0.058	\$1,160
2059				\$20,000			\$20,000.00	0.054	\$1,086
2060				\$20,000			\$20,000.00	0.051	\$1,024
2061				\$20,000			\$20,000.00	0.048	\$966
2062				\$20,000			\$20,000.00	0.046	\$912
Total Present Value of Discounted Costs (Sum of Column (i))									\$1,934,031

Comments:

Maintenance is expected to be about \$20,000/year based on crew rates for vegetation bank management, channel maintenance (bottom scraping), erosion repair and other site-specific maintenance. There are no replacement, operations or administration costs associated with the project. The project life is expected to be 50 years.

The “Without Project” Baseline

Unionhouse Creek is a tributary to Morrison Creek in the southern part of the City of Sacramento (City) and in unincorporated Sacramento County (County). East of Franklin Boulevard, the creek is confined to an excavated channel. Hydraulic modeling studies indicate that the portion of the channel between Franklin Boulevard and Center Parkway floods out of bank in 100-year and more frequent storms. The modeled flows exiting the channel inundate low lying urban neighborhoods on both sides of the creek, endangering approximately 250 to 300 homes in the inundation area. Without the proposed project, this potential for flood inundation will continue to exist and threaten these homes.

In addition to the homes, flooding from Upper Unionhouse Creek threatens ongoing regional transportation planning efforts in the publically owned corridor adjacent to Unionhouse Creek between Franklin Boulevard and Bruceville Road. This corridor currently contains Cosumnes River Boulevard, a two lane road that extends eastward from Franklin Boulevard to Highway 99. The City has plans to expand this roadway into a four-lane expressway that connects Highway 99 and Interstate 5 near the town of Freeport. In addition, the Sacramento Regional Transit Authority (RT) has received Federal approval to extend light rail service though this corridor along the northern edge of the expanded roadway. Neither project can proceed until the flood control issues associated with Unionhouse Creek are resolved.

Water Supply Benefits

Although no water supply benefits have been monetized, one water supply benefit has been identified for the Upper Unionhouse Creek Flood Protection Project.

The project described herein is a stormwater flood management project, and as such, does not provide any significant water supply benefits. However, the Upper Unionhouse Creek Flood Protection Project will provide incidental groundwater recharge benefits to the underlying Central Basin groundwater aquifer through the percolation of stormwater in unlined sections of the channel and through cracks in paving that may occur in the channel bottom and sides.

Distribution of Project Benefits

Beneficiaries of this project include the population living and working in the southern Sacramento area and water suppliers who utilize the Central Basin groundwater aquifers as a water source.

Table 3: Project Beneficiaries Summary

Local	Regional
Population in southern Sacramento	Water Suppliers using the Central Basin groundwater aquifers

Project Benefits Timeline Description

The project's water supply benefits will incrementally improve following completion of channel widening and with age. Project implementation is scheduled to occur in 2012; incremental benefits will be realized following completion of the project.

Potential Adverse Effects from the Project

As with any stormwater infiltration project, there is the potential for the infiltration of stormwater to carry pollutants into the subsurface. However, given the incremental nature of the water supply benefits provided by this project (e.g. the limited amount of stormwater infiltration) and considering the occurrence of soil aquifer treatment resulting during the infiltration and percolation processes, there are no potential adverse effects associated with the project.

Summary of Findings, Tables

The Upper Unionhouse Flood Protection Project does convey incidental water supply benefits along with flood damage reduction benefits (which are the primary motivation for the project) and other benefits. The project will reduce the frequency of flooding in the Upper Unionhouse Creek area, and by the nature of the project, will promote the incidental recharge of the underlying groundwater basin. These water supply benefits are summarized in Table 4.

Table 4: Qualitative Benefits Summary – Water Supply Benefits

Benefit	Qualitative Indicator
Incidental groundwater recharge of aquifers in the Central Basin	+

Omissions, Biases and Uncertainties

This analysis of costs and benefits is based on available data and some assumptions. As a result, there may be some omissions, uncertainties, and possible biases. In this analysis, the main uncertainties are associated with the extent to which this project will promote groundwater recharge. These issues are listed in Table 5.

Table 5: Omissions, Biases, and Uncertainties, and Their Effect on the Project

Benefit or Cost Category	Likely Impact on Net Benefits*	Comment
Benefit of supplemental groundwater supply	U	The volume of potential stormwater infiltration to the underlying shallow aquifers of the Central Basin is not quantifiable and will vary with time and runoff frequency and volume.
*Direction and magnitude of effect on net benefits: + = Likely to increase net benefits relative to quantified estimates. ++ = Likely to increase net benefits significantly. - = Likely to decrease benefits. -- = Likely to decrease net benefits significantly. U = Uncertain, could be + or -.		